

What is claimed is:

1. A core assembly apparatus, comprising
a rotating table, said table being rotatable to a plurality of operation positions,
a plurality of core assembly fixtures carried adjacent the periphery of the rotating table,
one for each operation position, said plurality of core assembly fixtures being inclined toward the central portion of the rotating table,
one of said operation positions comprising means for automatically transferring a completed core assembly from a core assembly fixture to a horizontal conveyor.
2. The core assembly apparatus of claim 1, wherein said means for automatically transferring a completed core assembly to a horizontal conveyor comprises a transfer mechanism adjacent said one operation position including
a plurality of vertical supports straddling said horizontal conveyor;
a framework movably carried by the plurality of vertical supports and drivable toward and away from the rotating table,
a truck movably carried by said framework and drivable both horizontally along said framework between said supports and pivotally with respect to said supports, a plurality of hydraulic piston/cylinder units with their cylinders being carried by said truck with their pistons extendible below said truck, the pistons of said plurality of piston/cylinder units carrying a core assembly gripping mechanism at their distal ends and being extendible outwardly from and retractable inwardly toward said truck,
wherein upon arrival of a completed core assembly at said one operation position, (a) said framework is driven vertically toward the top of said supports, (b) said pistons are retracted, raising said core assembly gripping mechanism, (c) said truck is driven toward said rotating table and is pivoted so the core assembly gripping mechanism is inclined at the same angle as the completed core assembly, (d) said pistons of said plurality of piston/cylinder units are extended so the core assembly gripping mechanism is in position for engagement with the completed core assembly, (e) said core assembly gripping mechanism is operated to engage the completed core assembly, (f) said pistons of said plurality of piston/cylinder units are retracted to lift said completed core assembly from the core assembly fixture of the rotating table, (g) said truck is driven away from the rotating table while carrying the completed core assembly, and is pivoted

so the completed core assembly is horizontally oriented, (h) said framework is driven downwardly and the pistons of the plurality of piston/cylinder units are extended to place the completed core assembly on the horizontal conveyor, and (i) the core assembly gripping mechanism is operated for disengagement of the core assembly gripping mechanism from the completed core assembly.

3. The core assembly apparatus of claim 1 wherein said core assembly fixtures are pivotally attached to the rotating table and includes core assembly gripping means, and wherein said core assembly fixtures at each of the operation positions includes means engageable with said core assembly fixture at said one operation station and drivable to pivot the core assembly fixture and lower said completed core assembly onto said horizontal conveyor for disengagement of the core assembly gripping means.

4. The core assembly apparatus of claim 3 wherein each of the core assembly fixtures is connected with a semicircular gear, and said means engageable with said core assembly fixtures comprises a spur gear transversely movable between a first position disengaged from said semicircular gear and a second position engaged with said semicircular gear, said spur gear being drivable by a motor and belt drive in said second position to pivot the core assembly fixture and lower said completed core assembly into said horizontal conveyor.

5. A pick-and-place apparatus for removal of an assembled core package from a core assembly fixture, comprising

- a gantry including a plurality of vertical supports straddling a conveyor onto which assembled core packages are to be placed,

- a framework that is carried by said vertical supports and movable vertically between said vertical supports,

- first means for driving said framework vertically with respect to said vertical supports,

- a truck that is carried by said framework and is movable both horizontally and pivotally on said framework,

- second means for driving said truck horizontally with respect to said framework, and

- third means for pivoting said truck with respect to said truck,

- a plurality of piston/cylinder units carried by said truck with their cylinders fixed to said truck with their pistons being extendible from and retractable within their cylinders,
- a core package engagement means carried at the distal ends of said pistons,
- fourth means for extending and retracting the pistons of the plurality of piston/cylinder units in and out of their cylinders,
- fifth means for operating said core assembly engagement means, and
- sixth means for operating said pick-and-place assembly by
- (a) operating said first means to drive the framework vertically,
 - (b) operating said fourth means to retract said plurality of pistons within their cylinders,
 - (c) operating said second means to move the truck toward an adjacent core package and operating said third means to pivot the truck until the core package engagement means is angled for engagement with the adjacent core package,
 - (d) operating said fourth means to extend said pistons of the plurality of piston/cylinder units to position said core assembly engagement means for engagement with the adjacent core package,
 - (e) operating said fifth means so said core package engagement means engages the adjacent core package,
 - (f) operating said fourth means to retract said pistons of the plurality of piston/cylinder units and to carry said core package within said core vertical supports,
 - (g) operating said second means to move the truck away from the core assembly fixture and operating said third means to pivot the truck and place the core package in a horizontal position,
 - (h) operating the first means and fourth means to move the framework, the pistons of the plurality of piston/cylinder units, the core package engagement means and the engaged core package downwardly to place the core package on the horizontal conveyor, and
 - (i) operating the core package engagement means to disengage the pick-and-place assembly from the core package on the horizontal conveyor.

6. A core assembly apparatus, comprising
 - a rotating table, said table being rotatable to a plurality of operation positions,
 - a plurality of core assembly fixtures carried adjacent the periphery of the rotating table, one for each operation position, said plurality of core assembly fixtures being inclined toward the central portion of the rotating table, and
 - a pick-and-place assembly adjacent one of said operation positions comprising means for moving a core engagement means horizontally, pivotally, and vertically for engagement with a completed core assembly and transfer of the completed core assembly from a core assembly fixture to a horizontal conveyor.
7. The core assembly apparatus of claim 6, wherein said pick-and-place assembly comprises
 - a plurality of vertical supports straddling said horizontal conveyor;
 - a framework movably carried by the plurality of vertical supports and drivable toward and away from the rotating table,
 - a truck movably carried by said framework and drivable both horizontally along said framework between said supports and pivotally with respect to said supports, a plurality of hydraulic piston/cylinder units with their cylinders being carried by said truck with their pistons extendible below said truck, the pistons of said plurality of piston/cylinder units carrying a core assembly gripping mechanism at their distal ends and being extendible outwardly from and retractable inwardly toward said truck,
 - wherein upon arrival of a completed core assembly at said one operation position, (a) said framework is driven vertically toward the top of said supports, (b) said pistons are retracted, raising said core assembly gripping mechanism, (c) said truck is driven toward said rotating table and is pivoted so the core assembly gripping mechanism is inclined at the same angle as the completed core assembly, (d) said pistons of said plurality of piston/cylinder units are extended so the core assembly gripping mechanism is in position for engagement with the completed core assembly, (e) said core assembly gripping mechanism is operated to engage the completed core assembly, (f) said pistons of said plurality of piston/cylinder units are retracted to lift said completed core assembly from the core assembly fixture of the rotating table, (g) said truck is driven away from the rotating table while carrying the completed core assembly, and is pivoted so the completed core assembly is horizontally oriented, (h) said framework is driven

downwardly and the pistons of the plurality of piston/cylinder units are extended to place the completed core assembly on the horizontal conveyor, and (i) the core assembly gripping mechanism is operated for disengagement of the core assembly gripping mechanism from the completed core assembly.

8. A core assembly apparatus, comprising
 - a rotating table, said table being rotatable to a plurality of operation positions,
 - a plurality of core assembly fixtures carried adjacent the periphery of the rotating table, one for each operation position, said plurality of core assembly fixtures being inclined toward the central portion of the rotating table, and
 - means for engaging a completed core assembly and automatically moving the completed core assembly angularly and pivotally from its inclined position on a core assembly fixture to a horizontal conveyor.
9. The core assembly apparatus of claim 8, wherein said means comprises
 - a plurality of vertical supports straddling said horizontal conveyor;
 - a framework movably carried by the plurality of vertical supports and drivable toward and away from the rotating table,
 - a truck movably carried by said framework and drivable both horizontally along said framework between said supports and pivotally with respect to said supports, a plurality of hydraulic piston/cylinder units with their cylinders being carried by said truck with their pistons extendible below said truck, the pistons of said plurality of piston/cylinder units carrying a core assembly gripping mechanism at their distal ends and being extendible outwardly from and retractable inwardly toward said truck,
 - wherein upon arrival of a completed core assembly at said one operation position, (a) said framework is driven vertically toward the top of said supports, (b) said pistons are retracted, raising said core assembly gripping mechanism, (c) said truck is driven toward said rotating table and is pivoted so the core assembly gripping mechanism is inclined at the same angle as the completed core assembly, (d) said pistons of said plurality of piston/cylinder units are extended so the core assembly gripping mechanism is in position for engagement with the completed core assembly, (e) said core assembly gripping mechanism is operated to engage the completed core assembly, (f) said pistons of said plurality of piston/cylinder units are retracted to lift said

completed core assembly from the core assembly fixture of the rotating table, (g) said truck is driven away from the rotating table while carrying the completed core assembly, and is pivoted so the completed core assembly is horizontally oriented, (h) said framework is driven downwardly and the pistons of the plurality of piston/cylinder units are extended to place the completed core assembly on the horizontal conveyor, and (i) the core assembly gripping mechanism is operated for disengagement of the core assembly gripping mechanism from the completed core assembly.

10. The core assembly apparatus of claim 8 wherein said means comprises core assembly fixtures that are pivotally attached to the rotating table and include core assembly gripping means, and wherein said core assembly fixtures at each of the operation positions includes means engageable with said core assembly fixture at said one operation station and drivable to pivot the core assembly fixture and lower said completed core assembly onto said horizontal conveyor for disengagement of the core assembly gripping means.